What is claimed is:

1. A method of halftoning for multi-pass rendering, wherein different pixel locations are rendered in each pass, the method comprising restricting a substantial majority of the pixels turned on to render a tone to the minimum number of passes required to produce the tone.

2. The method of halftoning defined in claim 1 wherein the substantial majority is approximately 75% or more of the pixels turned on to render a tone.

3. The method of halftoning defined in claim 1 wherein the substantial majority is approximately 90% or more of the pixels turned on to render a tone.

4. The method of halftoning defined in claim 1 further comprising:

generating a stochastic screen pixel turn-on sequence; and

partitioning the stochastic screen pixel turn-on sequence into a plurality of partitions, wherein each partition corresponds to a different pass.

5. The method of halftoning defined in claim 4 wherein the restricting step includes re-ordering the stochastic screen pixel turn-on sequence to restrict a substantial majority of the pixels turned on to render a tone to the minimum number of passes required to produce the tone.

6. The method of halftoning defined in claim 5 further comprising generating a stochastic halftone screen

using the re-ordered stochastic screen pixel turn-on sequence.

7. The method of halftoning defined in claim 5 wherein the re-ordering step includes placing the lowest stochastic screen pixel turn-on sequence values in one partition and the highest stochastic screen pixel turn-on sequence values in another partition.

8. The method of halftoning defined in claim 7 wherein the re-ordering step further includes:

a) replacing the lowest stochastic screen pixel turn-on value before re-ordering contained in one partition with a replacement value which is the lowest stochastic screen pixel turn-on sequence value of all partitions of the screen;

b) replacing the next lowest stochastic screen pixel turn-on value in the one partition with a replacement value which is the next lowest stochastic screen pixel turn-on sequence value of all partitions of the screen;

c) repeating step b) until the one partition is filled with the lowest stochastic screen pixel turn-on sequence values of all partitions; and

d) repeating steps a) through c) to re-order each of the other partitions in turn with the remaining unused replacement values.

9. The method of halftoning defined in claim 7 wherein the re-ordering step further includes:

a) obtaining a subsequence for each partition by arranging the pixels within the partition in increasing order of turn-on sequence values;

b) concatenating the subsequences for the different partitions, in any order, to form a single sequence; and

c) renumbering the resulting single sequence in increasing order of turn-on values to obtain the new turn-on sequence.

10. The method of halftoning defined in claim 5 wherein the partitioning step includes partitioning the stochastic screen pixel turn-on sequence into two partitions.

11. The method of halftoning defined in claim 10 wherein the partitions are designated $S1$ and $S2$ and the merit function is $\tilde{M}(S) = M(S) + w_1 * M(S1) + w_2 * M(S2)$, where $M(S)$ is a merit function suitable for a single stochastic screen and w_1 and w_2 are weighting factors in the range of 2 to approximately 100.

12. The method of halftoning defined in claim 11 wherein the partitioning step includes partitioning into a checkerboard partition arrangement.

13. The method of halftoning defined in claim 12 wherein the step of generating a stochastic screen pixel turn-on sequence includes generating a halftone screen for a checkerboard partition such that the pixels can be classified as belonging to the two partitions using the coordinates of columns and rows, i and j, and the mathematical rule

$$\begin{aligned} &p(i,j) \in S1, \quad if (i+j)\%2 = 0; \\ &p(i,j) \in S2, \quad if (i+j)\%2 = 1; \\ &S = S1 + S2 \end{aligned}$$

and optimizing the merit function

$$\widetilde{M}(S)=M(S)+w_1*M(S1)+w_2*M(S2),$$

where w_1 and w_2 are weighting factors each in the range of approximately 2 to approximately 100.

14. The method of halftoning defined in claim 13 wherein $w_1 \approx 3$ and $w_2 \approx 3$.

15. The method of halftoning defined in claim 1 further comprising:

providing an input image having a plurality of pixels each having an input tone value;

partitioning the input image pixels into partitions wherein each partition corresponds to a different pass;

adding an error diffused from previously processed pixels to the input tone value of a current pixel to achieve a desired pixel value; and

comparing the desired pixel value with a threshold value, wherein the restricting step includes adding a zero mean bias signal to the input tone value based on the partition containing the input image pixel.

16. The method of halftoning defined in claim 15 wherein the partitioning step includes partitioning the input image pixels into two partitions.

17. The method of halftoning defined in claim 16 wherein the partitioning step includes partitioning the input image pixels into a checkerboard partition.

18. The method of halftoning defined in claim 16 wherein the zero mean bias signal has a value of +D for one partition and -D for the other partition.

19. The method of halftoning defined in claim 18 wherein the input image tone value can be one of 256 values and the value of D is between approximately 32 and 64.

20. The method of halftoning defined in claim 1 further comprising:

providing an input image having a plurality of pixels each having an input tone value;

partitioning the input image pixels into partitions wherein each partition corresponds to a different pass;

adding an error diffused from previously processed pixels to the input tone value of a current pixel to achieve a desired pixel value; and

comparing the desired pixel value with a threshold value, wherein the restricting step includes adding a zero mean bias signal to the threshold value based on which partition contains the input image pixel.

21. The method of halftoning defined in claim 20 wherein the partitioning step includes partitioning the input image pixels into two partitions.

22. The method of halftoning defined in claim 21 wherein the partitioning step includes partitioning the input image pixels into a checkerboard partition.

23. The method of halftoning defined in claim 21 wherein the zero mean bias signal has a value of +D for one partition and -D for the other partition.

24. The method of halftoning defined in claim 23 wherein the input image tone value can be one of 256

values and the value of D is between approximately 32 and 64.

25. A method of generating a stochastic halftone screen for multi-pass rendering, wherein different pixel locations are rendered in each pass, the method comprising restricting a substantial majority of the pixels turned on to render a tone to the minimum number of passes required to produce the tone.

26. The method of generating a stochastic halftone screen defined in claim 25 further comprising:

generating a pixel turn-on sequence; and

partitioning the turn-on sequence into a plurality of partitions corresponding to rendering passes, wherein the restricting step includes re-ordering the pixel turn-on sequence.

27. The method of generating a stochastic halftone screen defined in claim 25 wherein the step of generating a pixel turn-on sequence includes optimizing a merit function representative of the halftone texture quality.

28. A system for halftoning for multi-pass rendering of an image having pixels, wherein different pixels are rendered in each pass, the system comprising, means for restricting a substantial majority of the pixels turned on to render a tone to the minimum number of passes required to produce the tone.

29. The system defined in claim 28 further comprising:

a stochastic screen pixel turn-on sequence generator; and

means for partitioning the stochastic screen pixel turn-on sequence into a plurality of partitions each partition corresponding to a different pass, wherein the restricting means includes means for re-ordering the stochastic screen pixel turn-on sequence to restrict a substantial majority of the pixels turned on to render a tone to the minimum number of passes required to produce the tone.

30. The system defined in claim 28 further comprising:

means for partitioning an input image having a plurality of input pixel tone values into a plurality of partitioned pixel tone values;

means for processing the partitioned pixel tone values to produce a previously processed pixel error diffusion value;

means for processing a current partitioned input pixel tone value including means for adding the previously processed pixel error diffusion value to the current partitioned input pixel tone value to achieve a desired pixel value; and

means for comparing the desired pixel value with a threshold value to produce an output signal for rendering the image, wherein the means for restricting includes means for adding a zero mean bias signal to the current partitioned input pixel tone value, the zero mean bias signal being based on the partition containing the partitioned pixel tone value.

31. The system defined in claim 28 further comprising:

means for partitioning an input image having a plurality of input pixel tone values into a plurality of partitioned pixel tone values;

means for processing the partitioned pixel tone values to produce a previously processed pixel error diffusion value;

means for processing a partitioned input pixel tone value including means for adding the previously processed pixel error diffusion value to the partitioned input pixel tone value to achieve a desired pixel value; and

means for comparing the desired pixel value with a threshold value to produce an output signal for rendering the image, wherein the means for restricting includes means for adding a zero mean bias signal to the threshold value, the zero mean bias signal being based on the partition containing the partitioned pixel tone value.